WHAT IS CLAIMED IS:

1. A coating apparatus comprising:

a noncircular reactant inlet defining a reactant stream path;

optical elements forming a light path intersecting the reactant stream path at a reaction zone with a product stream path continuing from the reaction zone; and

a first substrate intersecting the product stream path; and

a motor connected to the apparatus such that operation of the motor moves the first substrate relative to the product stream.

2. The apparatus of claim 1 further comprising a reaction chamber, a deposition chamber and a conduit connecting the reaction chamber to the deposition chamber, wherein the reactant inlet is within the reaction chamber and the first substrate is within the deposition chamber.

3. The apparatus of claim 2 wherein the motor moves the first substrate relative to the conduit.

4. The apparatus of claim 2 wherein the motor moves the conduit relative to the deposition chamber.

5. The apparatus of claim 2 further comprising a pump connected to the deposition apparatus, and wherein the reaction chamber and the deposition chamber are sealed from the ambient atmosphere.

6. The apparatus of claim 1 further comprising a chamber sealed from the ambient atmosphere and a pump connected to the chamber, wherein the reactant inlet and the first substrate are within the chamber.

7. The apparatus of claim 1 wherein the optical elements comprise a cylindrical lens.

8. The apparatus of claim 1 wherein the particle production apparatus further comprises a laser positioned to direct a laser beam along the light path.

9. The apparatus of claim 1 wherein the particle production apparatus further comprises a reactant supply system connected to the reactant inlet comprising a source of gaseous reactants.

10. The apparatus of claim 1 wherein the particle production apparatus further comprises a reactant supply system comprising an aerosol generator.

11. The apparatus of claim 1 wherein the particle production apparatus further comprises a shielding gas duct surrounding the reactant inlet.

12. The apparatus of claim 1 wherein the deposition apparatus further comprises a stage supporting the first substrate and connected to the motor and wherein the motor moves the stage relative to the product stream path to direct the product stream path at different portions of the first substrate.

13. The apparatus of claim 12 wherein the reactant inlet is elongated in one dimension and wherein the product stream has a shape of a line of particles on the substrate and wherein the stage moves relative to the product stream to sweep the line across the substrate surface.

14. The apparatus of claim 1 further comprising a second substrate and a stage connected to the motor supporting the first substrate and second substrate and wherein the motor moves the stage relative to the product stream to remove the first substrate from an intersection with the product stream and place the second substrate within the product stream.

15. The apparatus of claim 1 further comprising an external field generator positioned to produce an external field that directs the product stream to intersect the first substrate.

16. The apparatus of claim 15 wherein the external field generator comprises a thermal gradient generator or an electric field generator.

17. The apparatus of claim 15 wherein the external field generator is positioned to defocus the product stream path to deposit an approximately uniform coating over the entire substrate surface.

18. A method of coating a substrate, the method comprising:

reacting a reactant stream by directing a focused radiation beam at the reactant stream to produce a product stream comprising particles downstream from the radiation beam, wherein the reaction is driven by energy from the radiation beam;

directing the product stream to a substrate; and

moving the substrate relative to the product stream to coat the substrate.

19. The method of claim 18 wherein the radiation beam is generated by a light source.

20. The method of claim 18 wherein the radiation beam is generated by a laser.

21. The method of claim 18 further comprising pumping on the reaction chamber to maintain flow through the reaction chamber.

22. The method of claim 18 wherein the reactant stream is elongated in a direction along the propagation of the radiation beam.

23. The method of claim 18 wherein the substrate is mounted on a stage that moves relative to a product stream.

24. The method of claim 23 wherein the reactant stream is elongated in a direction along the propagation of the radiation beam to produce a line of product particles that are simultaneously deposited on the substrate and wherein relative movement of the stage sweeps the line across the substrate.

25. The method of claim 23 further comprising moving the substrate from the path of the reactant stream and placing another substrate in the path of the product stream.

26. The method of claim 18 wherein the reactant stream is elongated and wherein a line of light propagates to intersect the elongated reactant stream.

27. The method of claim 18 wherein the reactant inlet moves relative to the substrate such that motion of the reactant inlet sweeps the product particles across the substrate.

28. The method of claim 18 wherein the product stream passes through a conduit prior to reaching the substrate and wherein the conduit moves relative to the substrate with motion of the conduit sweeping the product particles across the substrate.

29. The method of claim 18 wherein an external field is applied to direct the product stream.

30. A method of forming a glass coating comprising heating a particle coating at a temperature and for a period of time sufficient to fuse the particles into a glass and where the particle coating is formed according to the method of claim 18.

31. A method of forming an optical component on a substrate surface, the method comprising removing a

portion of a glass coating formed according to the method of claim 30 to form the optical component.

32. The method of claim 31 wherein the removing of a portion of the glass coating is performed by photolithography.

33. A method of coating a substrate comprising:

generating a reactant stream with a cross section perpendicular to the propagation direction characterized by a major axis and a minor axis, the major axis being at least a factor of two greater than the minor axis;

reacting the reactant stream to form a product stream of particles; and

directing the stream of particles to a substrate, wherein flow of the product stream is maintained other than by pumping on the substrate.

34. The method of claim 33 wherein at least about 25 grams per hour are deposited onto the substrate.

35. The method of claim 33 wherein the reaction is driven by a light beam.

36. The method of claim 33 wherein the major axis is at least a factor of ten greater than the minor axis.

37. The method of claim 33 wherein the flow of the stream of particles is maintained by momentum of the product stream.

38. The method of claim 33 wherein the flow of the stream of particles is maintained by pumping out a chamber and wherein the substrate is located within the chamber.

39. A method of coating a substrate having a diameter greater than about 5 cm, the method comprising:

reacting a reactant stream to form a product stream comprising product particles; and

depositing simultaneously a stream of particles over the entire surface of the substrate and wherein at least about 5 grams per hour of particles are deposited onto the substrate.

40. The method of claim 39 wherein the product stream of particles is defocused with an external field.

41. The method of claim 40 wherein the external field is generated by thermal gradient generator or an electric field generator.

42. A method of coating a substrate comprising:

simultaneously generating multiple product streams by chemical reaction driven by a light beam; and

depositing the multiple product streams simultaneously on a moving substrate at sequential locations on the substrate.